



# ACCREDITATION REQUIREMENTS OF GEOTECHNICAL INVESTIGATION LABORATORIES

**DAC-REQ-02**

June 2008



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## 1. GENERAL

- 1.1 This document DAC-Req-02 describes the requirements for accreditation of Laboratories working in the field of geotechnical investigation under the accreditation program operated by the Dubai accreditation Department (DAC) of Dubai Municipality. This accreditation program is being implemented in order to provide a means of assessing and accrediting the competence of the laboratory to carry out tests and related activities for the requirements of Dubai Municipality.
- 1.2 This document should be read in conjunction with the International Standard *ISO/ IEC 17025: 2005 General requirement for the competence of testing and calibration laboratories* and DAC document *Accreditation Requirements DAC-REQ-01*.
- 1.3 DAC-Req-02 has been produced by DAC and the DCLD Technical Working Group for Accreditation of Soil Investigation.
- 1.4 DAC-Req-02 shall be used for accreditation of laboratories performing geotechnical investigation testing.
- 1.5 While accreditation will normally be an indication of the quality of services offered by the laboratory, it should not be regarded as a guarantee that the laboratory will always maintain a particular level of performance. It shall not, in any way, diminish the contractual obligation between the laboratory and its clients.

## 2 SCOPE

2.1 The accreditation program shall cover the following activities and tests related to geotechnical investigation:

|       |   |  |
|-------|---|--|
| 2.1.1 | Site Work:<br><br>2.1.1.1 Standard Penetration Test<br><br>2.1.1.2 Soil Sampling<br>2.1.1.3 Ground Water Level Measurement<br><br>2.1.1.4 Ground Water Sampling   | BS 1377 part 9, section 3.3<br>BS 1377 part 9 (R 2003), section 3.3<br>BS 5930 Clause 22<br>BS 5930 Clause 23.2 & 27.5 & 47.2.7<br>BS 5930 Clause 23.3 |
| 2.1.2 | Chemical tests:<br><br>2.1.2.1 Acid soluble sulphate content of soil<br>2.1.2.2 Water soluble sulphate content of soil<br>2.1.2.3 Acid soluble chloride content of soil<br>2.1.2.4 Water soluble chloride content of soil<br>2.1.2.5 pH of soil<br>2.1.2.6 pH of ground water<br>2.1.2.7 Sulphate content of ground water<br>2.1.2.8 Chloride content of ground water | BS 1377 1990 Part 3:<br>BS 1377 1990 (R 2003) Part 3:<br>Clause 5<br>Clause 5<br>Clause 7<br>Clause 7<br>Clause 9<br>Clause 9<br>Clause 5<br>Clause 7  |
| 2.1.3 | Classification test:<br>2.1.3.1 Particle Size Distribution  | BS 1377 1990 Part 2:<br>Clause 9.2<br>BS 1377 1990 (R 2003) Part 2:  |
| 2.1.4 | Core<br>2.1.4.1 Unconfined Compression Test<br>2.1.4.2 Rock Quality Designation<br>2.1.4.3 Core Recovery  | ASTM D 2938-95 & D 4543-01<br>ASTM D 2938-95 (R 2002) & D 4543-07<br>BS 5930 Clause 44.4.4   |
| 2.1.5 | Soil Description  | BS 5930<br>Clause 41 and 44, and Clark and Walker  |
| 2.1.6 | Reporting   | BS 5930 Section 7  |

2.2 Laboratories may apply for accreditation of other tests on geotechnical investigation not listed above, however; accreditation will depend on availability

of resources. Accordingly, DAC shall inform the applicant laboratory whether the test can be accredited or not.

- 2.3 Maritime works / offshore investigations (BS 5930 Clause 12.7.7):  
Maritime work is excluded from the accreditation of geotechnical investigation; should a company applies for accreditation for this work, the application will be studied at the time.

### 3. GENERAL REQUIREMENTS

- 3.1 The Laboratory applying for accreditation as per this program must have a system which includes the following as minimum:
- 3.2 Proper Documentation System of its policies, procedures and operations related to soil investigation activities starting from receiving the request for test, performing contract review, performing preparatory work for testing and drilling, performing tests and site activities, recording results and up to the issuance of the final report in accordance with the documentation requirements of *ISO/ IEC 17025: 2005 General requirements for the competence of testing and calibration laboratories* and any additional requirements set by DAC here within this document and other related documents, see also point 1.2 above.
- 3.3 Facilities properly equipped with the equipment and instruments appropriate for the type and range of tests under accreditation as minimum.
- 3.4 Employ the suitable and qualified technical and administrative staff in the laboratory, see also 4.1.
- 3.5 The laboratory must be registered in DCLD to operate in Dubai under Local Order 52/1990 and must have passed the adequacy and compliance audits as per the requirements of the local order.
- 3.6 The test Methods to be accredited must be included in the official list of tests submitted by the laboratory (Local Order 52/1990 DM Form 4).
- 3.7 The laboratory shall operate in accordance with the requirements of *ISO/ IEC 17025: 2005 “General requirements for the competence of testing and calibration laboratories”* and the standard test methods referred to under point 2.1 above.
- 3.8 The laboratory shall prepare work program for its activities with a frequency suitable to its nature of work.
- 3.9 The laboratory shall obtain No Objection Certificates NOC prior to commencing drilling, regardless whether it is obtained by the laboratory or by its client.

## 4 SPECIFIC CRITERIA OF COMPETENCE

### 4.1 Qualification of Technical Staff (BS 5930, clause 17)

#### 4.1.1 Professional Staff

##### 4.1.1.1 The Professional Staff:

The professional staff shall be an experienced engineering geologist, geo-technical engineer, geologist or civil engineer according to the requirements of BS 5930, clause 17.2. He is responsible for planning, direction, execution, and supervision of ground investigation and final reporting.

##### 4.1.1.2 Drillers

4.1.1.2.1 The driller in charge of the drilling rig shall be skilled in the practice of exploration of the ground by means of boreholes testing, soil sampling and, making ground water observations in the boreholes as well as properly recording the information obtained.

##### 4.1.1.2.2 Drillers' logs

- i) The site investigation laboratory shall have a controlled form for the driller log. The driller must sign in the log.
- ii) A professional supervisor of the driller(s) must co-sign the driller's log whenever he makes visits to the site.

##### 4.1.1.2.3 Material identification by the driller

Drillers are required to be capable of making simple identification of soil types (Ref BS 5930 clause 17.4)

##### 4.1.1.2.4 Frequency of check visits to drillers by supervisor

Laboratories must be able to verify the drilling work. Laboratories must describe this point in their Quality Management System Documentation.

##### 4.1.1.2.5 Assessment of drillers for the purpose of accreditation

Drillers will be assessed by witnessing their performance in the field. Not all drillers may be assessed during the first visit but all drillers will be assessed within the 3-year validity period of the accreditation.

#### 4.1.1.3 Operators

Operators who are assisting the drillers shall be skilled and experienced in the safe use of rigs and plants for digging/ excavating.

#### 4.1.2 *Laboratory Staff*

The person in charge of the chemical testing in the laboratory shall have appropriate educational background in chemistry, adequate experience, and training in the field of chemical testing.

The person in charge of the soil testing in the laboratory shall have appropriate educational background in civil engineering or engineering geology, adequate experience, and training in the field of soil testing. The technical staff of the laboratory shall, likewise, have appropriate qualification.

#### 4.1.3 Staff Responsible for Preparation of Reports

The staff involved in preparing the final report shall have educational background in civil or geotechnical engineering, and/or geology, adequate experience, and training in the field of soil investigation reporting. The requirements of ISO 17025 clause 5.2.1 (Note 2) shall apply.

### 4.2 **Site Work, Sampling and Sampling Method**

#### 4.2.1 Site Work

##### 4.2.1.1 Work sheets used on site shall contain the following information as minimum:

- Driller log
- People on site
- Start/ finish times
- Problems
- Casing record

##### 4.2.1.2 Depth of Investigation

It is the responsibility of the client to determine the depth of investigation.

#### 4.2.2 *Sampling and Sampling Methods*

##### 4.2.2.1 Sampling

###### 4.2.2.1.1 Sample containers

Suitable plastic bags will be acceptable as long as they do not lead to losing sample integrity.

###### 4.2.2.1.2 Moisture content of samples taken above the water table

When the moisture content is needed from samples taken from above the water table, water (pressure) must not be used to eject the sample from the core barrel.

#### 4.2.2.1.3 Borehole Elevation datum

All elevations must be made to DMD.

#### 4.2.2.1.4 Sample Identification and Storage

- Using the same ID Number for head contractor and subcontractor is not accepted. However, traceability has to be ensured.
- The site investigation laboratory shall have a suitable storage place for samples that ensures maintaining the samples integrity and traceability. It has also to possess proper ventilation and lighting. Tested samples have to be retained in the storage area at least for one month from the date of issuing final report.

#### 4.2.2.2 Sampling Methods

- SPT: Shall be according to BS 1377 part 9, clause 3.3.
- Soil Sampling shall be according to BS 5930, clauses 22.3 and 22.4.
- Ground Water Level Measurement shall be according to BS 5930; clause 23.2, 27.5 and 47.2.7.
- Ground Water Sampling shall be according to BS 5930; clause 23.2.

### 4.3 Lab work and Test methods

4.3.1 The tests shall be carried out in accordance with the test methods mentioned in clause 2.1 above.

4.3.2 Chloride Determination.

BS 1377 Part 3 1990 clause 7.2.3.5 should be used for the determination of the chloride content in water; and the constant 0.003546 is to be used in the equation for the calculation of “chloride ion content in clause 7.2.4 additionally, the labs are required to:

- a) Report the method used and the units of the numerical value obtained.
- b) Use correct procedures for sampling the water, and consider that sampling is the single most important factor to get good chloride contents of water.

4.3.3 Unconfined compressive strength Test.

For weakly cemented sands, the laboratory should do the best it can; bearing in mind that there will be handling problems and end trimming

problems and overcoming these may depend on the actual sample being tested.

Attention is drawn to clause 1.2 of ASTM D 4543-01 “Preparing Rock Core Specimens and Determining Dimensional and Shape Tolerances” which notes that some rock types can be difficult to prepare.

#### 4.3.4 References.

All references used by the laboratories (such as standard test methods) shall be up-to-date.

#### 4.4 Geotechnical Site Investigation Report

The laboratory shall produce a report on the site investigation to fulfill the client’s needs and the applicable clauses of BS 5930 (principally Section 47). The requirements of relevant clauses of ISO/IEC 17025 shall apply. Opinions and interpretations that are included in the report are neither subject to assessment nor to accreditation.

#### 4.5 Internal Quality Control (for laboratory work)

The laboratory shall carry out internal quality control (IQC) testing in accordance with an IQC plan. The IQC result acceptability criteria should be clearly defined. The IQC may be in one or more, or a combination of the following:

- Use of certified reference materials
- Use of internal or external check samples
- Replicate testing using the same or different method
- Re-testing of retained items
- Spike and recovery experiments
- Use of control charts

Note 1: some of these IQC methods may be applicable for chemical testing but not for soil testing.

#### 4.6 Proficiency Testing (for laboratory work)

The laboratory shall participate in inter-laboratory proficiency program (PTP) and shall provide evidence that their results are within the acceptance criteria of the PTP organizer. The PTP may be organized by DAC or by any other recognized PTP providers in the field of chemical and soil testing.

#### 4.7 Equipment

Besides the requirements of clause 5 in the ISO/IEC 17025, the laboratory shall fulfill the following requirements:

4.7.1 Rig identification

Proper identification of all rigs is required.

4.7.2 Calibration of SPT assembly

a) Energy calibration methods are not acceptable.

b) Apart from (a) above, internal/ in-house calibration performed by the laboratory is acceptable provided that:

c) The calibration shall be conducted in accordance with documented calibration procedures approved by the laboratory management.

d) The reference standards used are traceable to national or international standards through a valid calibration certificate.

e) The laboratory personnel involved in calibration are qualified to conduct that calibration.

4.7.3 Storage yard for rigs

The site investigation laboratory shall have a suitable yard space for storage of its rigs within the Emirate of Dubai.

4.7.4 Sub-standard equipment

No substandard equipments are allowed for use. This includes SPT split samplers where the sampling shoe has (parallel) flats to aid assembly and dis-assembly.

**4.8 Safety**

Although safety is not included in the ISO/ IEC 17025: 2005 standard it is a requirement of the DM Requirements (L.O.52) and a pre-requisite for accepting the accreditation applications, therefore safety is considered as part of the accreditation requirements but will not be accredited.

**5 ACCREDITATION CERTIFICATE AND SCHEDULE OF ACCREDITED TESTS**

The Accreditation Certificate shall be valid for a period of three years. A Scope of Accreditation detailing the tests/activities for which the laboratory has been granted accreditation shall supplement the certificate.

## 6 SURVEILLANCE

### 6.1 Planned Announced Surveillance Visits

The accredited laboratory shall be subject to planned surveillance visits that will be carried out at least two times per year. The purpose of the surveillance visits is to ensure that the laboratory is continuing to comply with the accreditation program requirements. Accredited laboratory will be exempted from the regular surveillance visits done as per Local Order 52/1990 on registered laboratories. However, compliance with the requirements of Local Order 52 will be verified during the planned accreditation surveillance visits.

### 6.2 Planned Unannounced Surveillance Visits

Additional planned special surveillance visits may be carried out at the discretion of DAC and as the need arises without giving prior notifications to the accredited laboratory. Such visits are planned and carried out as per the DAC document *Code of Conduct of the Unannounced Surveillance Visits* and other relevant documents.

## 7 ACCREDITATION FEES

The accreditation fees shall be charged in accordance with '*Accreditation Fee Structure DAC-G2-03*'.

## 8 ACCREDITATION REQUIREMENTS

The relevant provisions of the "*Accreditation Requirements DAC-REQ-01*" shall apply to the accredited laboratories unless otherwise superseded by the provisions of this document.

## 9 CANCELLATIONS

The document 'Guidance for Accreditation of Geotechnical Investigation Laboratories' issued in April 2005 shall be cancelled and replaced by this Requirement, as shall any provision that contradicts or conflicts with the provisions of this Requirement.

## 10 REFERENCES

- 10.1 Local Order no. 52 Of 1990: On Conditions Required for Licensing Laboratories Operating in the Emirate of Dubai and its Rules of Implementation.
- 10.2 Accreditation Requirement DAC-REQ-01.
- 10.3 Accreditation Fee Structure DAC-G2-03.
- 10.4 ASTM D 2938-95: Standard test method for unconfined compressive strength of intact rock core specimens.
- 10.5 ASTM D 4543-01: Standard practices for preparing rock core specimens and determining dimensional and shape tolerances.
- 10.6 BS 1377: Methods of tests for soils for civil engineering purposes.
  - Part 1 General requirements and sample preparation,
  - Part 2 Classification tests,
  - Part 3 Chemical and electro-chemical tests,
  - Part 9 In-situ tests.
- 10.7 BS 5930: 1999 Code of practice for site investigations
- 10.8 ISO 17025: General requirements for the competence of testing and calibration laboratories
- 10.9 Clark, A.R. and Walker, B.F.: A proposed scheme for the classification and nomenclature for use in the engineering description of Middle Eastern sedimentary rocks. Geotechnique, Vol. 27 No. 1, pp 93-99, 1977.